Archives of Community and Family Medicine

ISSN: 2638-4787

Volume 3, Issue 1, 2020, PP: 28-30

Doctors without Distance: Using AI Tools Based on T2D Math-Physical Medicine Research Results to Assist a Community's Healthcare Service Remotely

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Introduction

In this paper, the author presents his concepts of utilizing modern computer technology and artificial intelligence (AI) to implement his vision of "Doctors-without-Distance" to provide clinical and community healthcare to type 2 diabetes (T2D) patients, especially for those patients located in remote or underdeveloped rural areas.

Methods and Results

The author has developed the following four prediction models based on his 9-year endocrinology and metabolism research:

(1) Body weight

(2) Fasting plasma glucose (FPG)

(3) Postprandial plasma glucose (PPG)

(4) Hemoglobin A1C (A1C)

He has further developed an AI Glucometer (AIG) software to be used on either smart phone or PC by applying optical physics, wave theory, energy theory, perturbation theory, big data analytics, structure mechanics, fluid mechanics, finite element engineering modeling concepts and techniques. He has collected and stored ~8 million food nutritional data in a cloud server. This serves as the central databank for the sophisticated glucose analysis and complex biomarker calculations via diet, exercise, and other factors.

Initially, we should select a nurse or dietitian to function as the local representative and mentor for T2D patients in remote areas. This person must be trained to implement the above-mentioned fundamental lifestyle management knowledge and AIG tool usage.

As shown in Figure 1, after being trained by the on-site medical professional, the patient should be able to use the AIG tool. At first, the patients must enter their weight in the morning and then the AIG will provide their predicted FPG value. During the day, the patients must select a meal type (breakfast, lunch, or dinner) and take their meal photos and then save them on their smart phone or PC. The patients then select their planned post-meal walking steps level at 10, 20, 30, 40, or 50 (in thousands of steps or in minutes). The AIG device will then return with their predicated PPG value. Based on these predicted FPG and PPG values, a mathematically simulated daily HbA1C value will then be calculated and shown on the device. Figure 2 displays an example of the predicted and measured Weight, FPG, PPG, and HbA1C (shown in 90-days moving averaged curves) of a T2D patient.

A body weight control feature is also available in the AIG, assisting overweight or obese patients through food portion control (see Figure 1).

The above biomedical information will be examined by a medical doctor, who will remotely monitor the status and progress of the patient's diabetes control through the internet or computer network.

The local healthcare representative is playing an essential role in the process of gathering information, transferring of knowledge, answering inquiries, and providing emotional support.

Through this proposed infrastructure and AI tool usage, centralized medical doctors will be able to take care of more patients than their normal workload compared to a traditional clinic style.

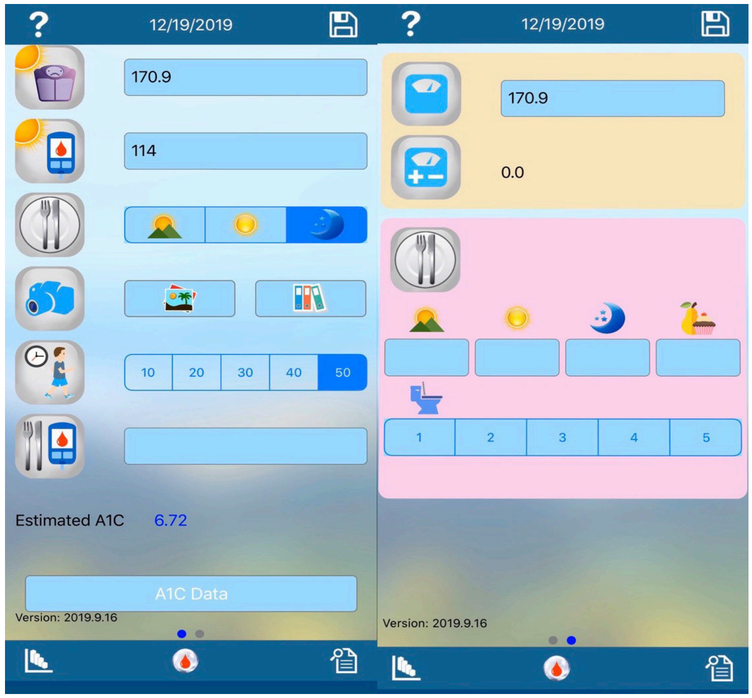

Figure 1: *Artificial Intelligence Glucometer (AIG)*

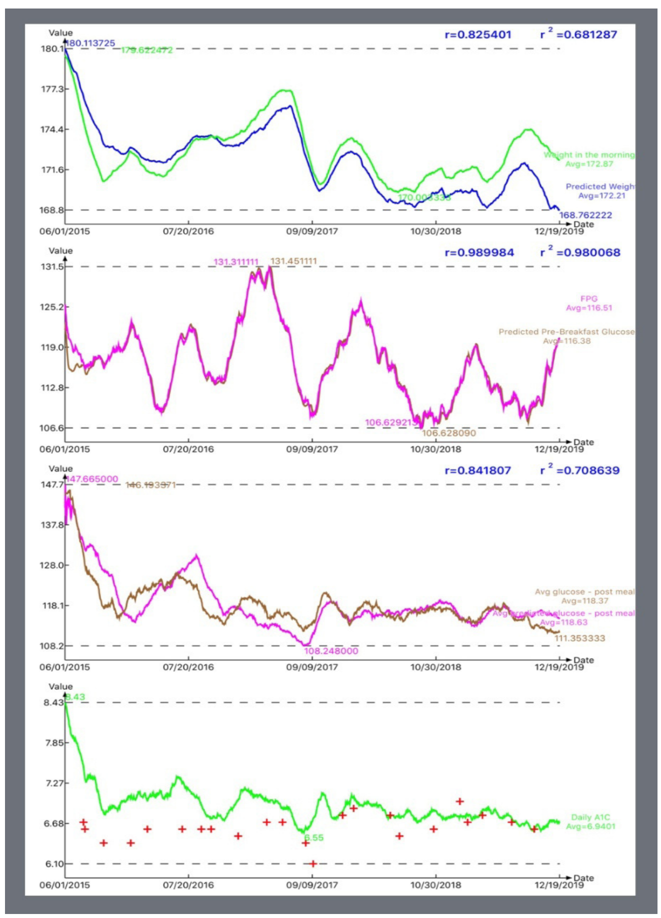

Figure 2: *Examples of Predicted and measured Body Weight, FPG, PPG, and HbA1C*

Conclusions

The author anticipates that his vision of "doctors-without-distance" by utilizing modern computer technology and advanced AI tools can provide better assistance, more efficient service, and a larger coverage for diabetes patients who live in remote areas.

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Citation: Gerald C. Hsu. *Doctors without Distance: Using AI Tools Based on T2D Math-Physical Medicine Research Results to Assist a Community's Healthcare Service Remotely. Archives of Community and Family Medicine. 2020; 3(1): 28-30.*